

WHAT IS CLAIMED IS:

1. A curable adhesive composition comprising

polyacrylate component,
epoxy component, and
cationic initiator,

wherein the uncured adhesive is optically clear such that

the luminous transmission of the composition is greater than 90%,
the haze of the composition is less than 2%, and
the opacity of the composition is less than 1%,

wherein the uncured, curable adhesive can be cured to form an adhesive comprising an interpenetrating polymer network, and

wherein after aging the cured adhesive at 90°C for 500 hours

the luminous transmission of the cured and aged adhesive is greater than 90%,
the haze of the cured and aged adhesive is less than 2%, and
the opacity of the cured and aged adhesive is less than 1%.

2. The adhesive of claim 1 wherein after aging at 80°C and 90% relative humidity for 500 hours

the luminous transmission of the cured and aged adhesive is greater than 90%,
the haze of the cured and aged adhesive is less than 2%, and
the opacity of the cured and aged adhesive is less than 1%.

3. The adhesive of claim 1 wherein the cured adhesive consists of a single phase.

4. The adhesive of claim 1 wherein the uncured adhesive comprises chemical functionalities reactive to chemically bond the polyacrylate component to the epoxy component.

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5. The adhesive of claim 1 wherein the polyacrylate component comprises a group reactive with the epoxy component.
 6. The adhesive of claim 5 wherein the polyacrylate component comprises a reactive group selected from the group consisting of a hydroxy group and a carboxylic acid group.
 7. The adhesive of claim 1 wherein the cured adhesive comprises an inter-reacted interpenetrating polymer network.
 8. The adhesive of claim 1 wherein the polyacrylate component is a polymer derived from free-radically polymerizable monomers selected from the group of acrylates, methacrylates, acrylic acids, and methacrylic acids.
 9. The adhesive of claim 1 wherein the polyacrylate component is a polymer derived from acrylic acid monomer.
 10. The adhesive of claim 1 comprising an epoxy component selected from the group consisting of aromatic and cycloaliphatic epoxy components.
 11. The adhesive of claim 1 wherein the cationic initiator comprises photoactivated cationic initiator.
 12. The adhesive of claim 11 wherein the photoactivated cationic initiator is selected from the group consisting of an iodonium salt, a sulfonium salt, and mixtures thereof.
 13. The adhesive of claim 1 comprising a photosensitizer.
 14. The adhesive of claim 1 comprising a free-radical photoinitiator selected from the group consisting of benzoin ethers, substituted benzoin ethers, substituted acetophenones, substituted alpha-ketols, aromatic sulfonyl chlorides, photoactive oximes, and mixtures thereof.

15. The composition of claim 1 comprising a grafting agent.
16. The composition of claim 15 wherein the grafting agent is 4-acryloxy benzophenone.
17. The composition of claim 15 comprising an epoxy-acrylate compound.
18. The composition of claim 15 comprising crosslinker.
19. The composition of claim 18 wherein the crosslinker comprises a multifunctional acrylate or (meth)acrylate.
20. The composition of claim 18 wherein the crosslinker is selected from the group consisting of hexanediol diacrylate, trimethylolpropane triacrylate, and mixtures thereof.
21. The composition of claim 1 comprising from about 5 to about 55 parts by weight epoxy per 100 parts combined epoxy and polyacrylate.
22. The composition of claim 1 comprising from about 10 to about 50 parts by weight epoxy per 100 parts by weight epoxy and polyacrylate.
23. A multi-layer assembly comprising a cured adhesive comprising an interpenetrating polymer network comprising polyacrylate component and epoxy component, wherein the adhesive composition is optically clear, and wherein the adhesive bonds a low moisture vapor transfer layer to an outgassing layer.
24. The assembly of claim 23 wherein the outgassing layer comprises a material selected from the group consisting of a polycarbonate and a poly(methyl methacrylate).
25. The assembly of claim 24 wherein after aging at 90°C for 500 hours, or 80°C and 90% relative humidity for 500 hours, the bond between the outgassing layer and the low

moisture vapor transfer layer does not delaminate or bubble, and the optical product remains optically clear such that

the luminous transmission of the optical product is greater than 90%,

the haze of the optical product is less than 2%, and

the opacity of the optical product is less than 1%.

26. The assembly of claim 24 wherein the low moisture vapor transfer layer comprises a metallized polymeric film.

27. The assembly of claim 24 wherein the low moisture vapor transfer layer has a moisture vapor transmission rate below about 30 grams per (square meter x 24 hours).

28. The assembly of claim 24 wherein the assembly comprises an antireflective optical element comprising a rigid polycarbonate layer adhered with the adhesive to a surface of a polyethylene terephthalate layer, an opposite surface of the polyethylene terephthalate layer being coated with multiple alternating layers of indium-tin-oxide and silicon oxide.

29. The assembly of claim 24 wherein the adhesive comprises an inter-reacted interpenetrating polymer network.

30. The assembly of claim 24 wherein the low moisture vapor transfer layer comprises an infrared reflecting film.

31. The assembly of claim 23 wherein the assembly comprises a conductive optical element comprising a rigid polycarbonate layer adhered with the adhesive to a surface of a polymeric film layer, an opposite surface of the polymeric film layer being coated with a conductive layer.

32. A multi-layer assembly comprising a cured adhesive comprising an interpenetrating polymer network comprising polyacrylate component and epoxy

component, wherein the adhesive composition is optically clear, and wherein the assembly comprises a fragile layer adhered to the adhesive.

33. The assembly of claim 32 wherein the cured adhesive provides structural support for the fragile layer.

34. The assembly of claim 32 wherein the fragile layer is a polarizing layer comprising oriented polyvinyl alcohol.

35. The assembly of claim 34 further comprising a second adhesive adhered to a second surface of the polarizer.

36. The assembly of claim 35 wherein the second adhesive is an optically clear cured adhesive comprising an interpenetrating polymer network comprising polyacrylate component and epoxy component.

37. The assembly of claim 34 consisting of a fragile polarizer bonded on both surfaces to an optically clear cured adhesive comprising an interpenetrating polymer network comprising polyacrylate component and epoxy component.

38. The assembly of claim 32 comprising:

a fragile polarizer bonded on a surface to a polycarbonate material, and

a polyethylene terephthalate film bonded with an adhesive to a second

surface of the fragile polarizer,

wherein at least one of the adhesives is an optically clear cured adhesive comprising an interpenetrating polymer network comprising polyacrylate component and epoxy component.

39. The assembly of claim 38 wherein the polycarbonate is bonded to glass using a pressure sensitive adhesive.

40. A method of preparing a multi-layer article, the method comprising

coating onto a release liner a curable adhesive composition comprising

polyacrylate component,

epoxy component,

cationic initiator, and

solvent

drying the curable adhesive composition to remove the solvent,

laminating the curable adhesive composition on a substrate, and

activating the initiator to cure the adhesive.

41. A method of providing structural support to a fragile optical element, the method comprising applying a curable adhesive composition comprising polyacrylate component, epoxy component, and cationic initiator, to a surface of the fragile optical element, and curing the adhesive.

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